

## A.2.8 Space Astrophysics Detector Development Program

### 1. Scope of Program

This Space Astrophysics Detector Development (SADD) program element solicits proposals for basic supporting research and technology in the area of detector development for space astronomy missions in the wavelength range greater than 100 Å. This range of wavelengths spans the extreme ultraviolet, ultraviolet, and visible spectral regimes, the three decades from the near-infrared to the millimeter regime, and extends several decades into the radio spectrum. This Program Element is for new development efforts, as well as for ongoing programs. Investigators currently receiving NASA support for detector development and who are interested in continuing this support must respond to this NRA. **Note that this program replaces the Space Ultraviolet Detector Development program and elements of the Infrared/Submillimeter/Radio/Interferometry Astronomy.** Solicitations for this newly defined program will be made annually.

The primary goal of the Space Astrophysics Detector Development (SADD) program is research into and the development of detectors representing the best possible state-of-the-art detector technology for instruments that may be proposed as candidate experiments for future space flight opportunities. Potential future astrophysics missions include instruments which might be flown on the Space Shuttle, Space Station, Small Explorer (SMEX) missions, Medium-class Explorer (MIDEX) missions, future space interferometers, and the Stratospheric Observatory for Infrared Astronomy (SOFIA). The intent of the SADD program is not to develop flight qualified hardware for specific instruments, but rather to understand the fundamental operational aspects of detectors and to develop them to the point where they can be proposed as part of an instrument for future announcements of flight opportunity.

Although any detector technology may be proposed to this opportunity, the Next Generation Space Telescope (NGST) project is currently actively supporting detector programs for that mission. Thus, proposals in response to this current NRA would be given a lower priority for developing detectors specifically to achieve NGST detector sensitivity goals. However, proposals are encouraged to increase the demonstrated wavelength coverage of detectors that might be used on NGST or to increase significantly the effective array size.

Considering currently available technology for detectors for space astronomy, the greatest emphasis of SADD will be towards those developmental efforts that address the technological problems associated with achieving some of the following desirable detector attributes (not in priority order):

- (1) High quantum efficiency;
- (2) Large array format (>2000 x 2000 pixels);
- (3) High spatial resolution;
- (4) Large dynamic range (both locally and globally on the detector);
- (5) High speed, high resolution read-out techniques;
- (6) Reduced noise;

- (7) Extending wavelength coverage (e.g., operation of submillimeter and radio receivers at high frequency or near-IR detectors to shorter wavelengths); and/or
- (8) Resistance to effects of operation in space.

Since the environment and constraints of space flight are far stricter than those for ground-based applications, research groups considering development of space detectors must be cognizant of the following characteristics that are highly desirable in reliable, space-quality detection systems: low mass, low sensitivity to particle radiation (“radiation hardness”), low power consumption, compactness, ability to operate in an “open face” mode for sensitivity at wavelengths shorter than 1100 Å, designed for operation in a vacuum (such that high voltage arcing is minimized), vibration tolerance, and ease of remote operation, including reduced transient effects and ease of calibration.

New measurement concepts may be proposed, as well as methods to improve the performance of existing detectors. Research into the basic properties of detector systems that could be considered for use in space is also strongly encouraged. It is not, however, the purpose of the SADD to support development of detectors that are primarily suitable for ground-based astronomy. Although ground-based observing with newly developed detectors may be necessary to verify the total detection system, this should not be the main thrust of a space detector development effort.

Proposers are asked to identify potential mechanisms which could facilitate transfer of these detector technologies to other users, including the private sector, for possible application beyond the immediate one of meeting mission science objectives. If at all possible, student participation in this SADD program is strongly encouraged, especially if it can be concluded within the nominal tenure of a graduate training. Therefore, brief details of the educational goals and training of such personnel should be included in the proposal. Note that such student participation is not to be confused with the Education and Outreach Program described in Section A.5.1.

## 2. Programmatic Information

It is expected that roughly \$2.7M will be available in FY 2000 for the funding of about 15 new three-year projects. Proposers are encouraged to define a program that may be accomplished in a three-year period. It is recognized that the proposed investigation may evolve with time. Accordingly, emphasis should be placed upon the first year's effort, with as much detail as possible provided relevant to the planned second and third year's activities. Proposals for investigations requiring less than a three-year time scale to complete are also acceptable, as are those which require a longer time scale to complete, though the latter must undergo peer review after three years. Key projected milestones and accomplishments during each period of the proposed effort should be identified.

NOTE: Appendix C contains critical information necessary for the preparation and submission of proposals submitted in response to this NRA. In particular, Section C.5.3 contains detailed standards concerning the format, page limits, and contents of a proposal. The submission of a proposal not in compliance with these standards may complicate and/or hinder its efficient and complete evaluation. Therefore, deficiencies in format and/or omission of key information may result in a proposal being found unacceptable for evaluation, or if evaluated, being adversely affected during the evaluation process.

The schedules for submission of the Notice of Intent (NOI) and proposal are given in Table 1 of the cover letter of this NRA. The World Wide Web site for submitting both the NOI and the *Cover Page/Proposal Summary* (see Appendix C.5.3) is <<http://props.oss.hq.nasa.gov>>; proposers without access to the Web or who experience difficulty in using this site may contact Ms. Debra Tripp (E-mail: [deb.tripp@hq.nasa.gov](mailto:deb.tripp@hq.nasa.gov)) for assistance. Hard copies of the proposals are to be delivered to:

ROSS-99 NASA Research Announcement  
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